

Title: Desertification

Subject: Subject (SNC2D)

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Introduction Of Desertification

Desertification of the arid lands of the world has been proceeding--sometimes rapidly, sometimes slowly--for more than a thousand years. It has caused untold misery among those most directly affected, yet environmental destruction continues. Until recently, few if any lessons seemed to have been learned from the past, in part because the problem was an insidious one that went unrecognized in its early stages or was seen as a local one affecting only a small population, and in part because new land was always available to start over again. As long as remedial action could be deferred by moving on to new frontiers, land conservation had little appeal. It was not until the 20th century--when easy land expansion came to an end--that governments and people finally realized that continued careless degradation of natural resources threatened their future.

Desertification spreads from a desert core, like a ripple on a pond. The truth is that land degradation can and does occur far from any climatic desert; the presence or absence of a nearby desert has no direct relation to desertification. Desertification usually begins as a spot on the land-scape where land abuse has become excessive. From that spot, land degradation spreads outward if the abuse continues. Ultimately the spots may merge into a homogeneous area, but that is unusual on a large scale.

Droughts are responsible for desertification. Droughts do increase the likelihood that the rate of degradation will increase on non-irrigated land if the carrying capacity is exceeded. However, well-managed land will recover from droughts with minimal adverse effects when the rains return. The deadly combination is land abuse during good periods and its continuation during periods of deficient rainfall. The famous satellite photograph taken during the 1970's drought in Niger showed a small green rectangle of land (The Ekrafane ranch) surrounded by a brown and barren land. The Ekrafane ranch owners had undertaken good ranch management while their neighbours had not. The result was during the drought had remained fertile while the surrounding land had not. Carrying Capacity is the number of people, other living organisms, or crops that a region can support without environmental degradation.

WHAT IS DESERTIFICATION

- **Desertification** is the persistent **degradation of dry-land ecosystems** by variations in climate and human activities. Home to a third of the human population in 2000, **drylands** occupy nearly half of Earth's land area. Across the world, desertification affects the livelihoods of millions of people who rely on the benefits that dryland ecosystems can provide.
- **Desertification** occurs as a result of a long-term failure to balance human demand for **ecosystem services** and the amount the ecosystem can supply. The pressure is increasing on **drylands ecosystems** for providing **services** such as food, forage, fuel, building materials, and water which is needed for humans, livestock, irrigation, and sanitation. This increase is attributed to a combination of human factors (such as population pressure and changes to the **land use patterns**) and climatic factors (**such as droughts**).
- Some **10–20%** of **drylands** are already **degraded**. Based on these rough estimates, about **1–6%** of the dryland people live in desertified areas, while a much larger number is under threat from further **desertification**. Scenarios of future development show that, if unchecked, desertification and degradation of ecosystem services in drylands will threaten future improvements in human **well-being** and possibly reverse gains in some regions. Therefore, desertification ranks among the greatest environmental challenges today and is a major impediment to meeting basic human needs in drylands.

WHAT CAUSES DESERTIFICATION

- Desertification occurs when the tree and plant cover that binds the soil is removed. It occurs when trees and bushes are stripped away for fuelwood and timber, or to clear land for cultivation.
- Animals eat away grasses and erode topsoil with their hooves.
- Intensive farming depletes the nutrients in the soil.
- Wind and water erosion aggravate the damage, carrying away topsoil and leaving behind a highly infertile mix of dust and sand. It is the combination of these factors that transforms degraded land into desert.
- Climate variations, where areas are consistently hot and dry, with long periods of no rain can cause soil conditions to deteriorate. The lack of rainfall leads to drought and eventually the necessary growing conditions for plants and animals disappear. Most plants, unless those plants are specially adapted to desert conditions, can not live in dry, arid conditions.
- Farming is also a major cause of **desertification** - soils need time to rest between crops but pressures to provide food and an income often lead to soil being over used and becoming

tired. Where farming is carried out in this way particular in places where climatic conditions have already placed the soil under can occur desertification.

- Overgrazing was not as large of a problem long ago because animals would move in response to rainfall. People would move with the animals so it prevented overgrazing in such areas. Now, humans do not have to move about. So they use fences to keep their animals in one place which causes overgrazing.
- Farming of average land is causing desertification worldwide. Farmers are clearing average land, and using it which takes away the richness in the soil. People should let the average land replenish itself before farming. (Desertification, 2005)
- Destruction of Plants in Dry Regions
- Destruction of plants in dry regions is causing desertification to occur. People are cutting down trees to use them as a source of fuel. Once all these trees are cut down there is nothing to protect the soil. Therefore, it turns to dust and is blown away by the wind.
- Incorrect irrigation is commonly used in poorer areas. Farmers are using canal irrigation and other poor techniques because of the lack of water. This type of irrigation causes a build up of salt in the soil. (Desertification, 2005) Soil salinity is the salt content in the soil; the process of increasing the salt content is known as salinization. Salts occur naturally within soils and water. Salination can be caused by natural processes such as mineral weathering or by the gradual withdrawal of an ocean.

IMPACT ON DESERTIFICATION

- Desertification is a global issue, with serious implications worldwide for biodiversity, eco-safety, poverty eradication, socio-economic stability and sustainable development.
- Drylands are already fragile. As they become degraded, the impact on people, livestock and environment can be devastating. Some 50 million people may be displaced within the next 10 years as a result of desertification.
- The issue of desertification is not new — it played a significant role in human history, contributing to the collapse of several large empires, and the displacement of local populations. But today, the pace of arable land degradation is estimated at 30 to 35 times the historical rate.

DESERTIFICATION ON HEALTH

Human activities that pollute or degrade land (including over-cultivation, overgrazing and deforestation) convert arable land into desert. As ecosystems change and deserts expand, food production diminishes, water sources dry up and populations are pressured to move to more hospitable areas.

- Higher threats of malnutrition from reduced food and water supplies;

More water- and food-borne diseases that result from poor hygiene and a lack of clean water;

Respiratory diseases caused by atmospheric dust from wind erosion and other air pollutants;

The spread of infectious diseases as populations migrate.

TOWARDS SUSTAINABLE DEVELOPMENT

What can be done?

- Reforestation and tree regeneration
- Water management — saving, reuse of treated water, rainwater harvesting, desalination, or direct use of seawater for salt-loving plants
- Fixating the soil through the use of sand fences, shelter belts, woodlots and windbreaks
- Enrichment and hyper-fertilizing of soil through planting
- Farmer Managed Natural Regeneration (FMNR), enabling native sprouting tree growth through selective pruning of shrub shoots. The residue from pruned trees can be used to provide mulching for fields thus increasing soil water retention and reducing evaporation.

WHAT ARE THE EFFECTS OF DESERTIFICATION?

- Desertification reduces the ability of land to support life, affecting wild species, domestic animals, agricultural crops and people. The reduction in plant cover that accompanies desertification leads to accelerated soil erosion by wind and water. South Africa losing approximately 300-400 million tonnes of topsoil every year. As vegetation cover and soil layer are reduced, rain drop impact and run-off increases.
- Water is lost off the land instead of soaking into the soil to provide moisture for plants. Even long-lived plants that would normally survive droughts die. A reduction in plant cover also results in a reduction in the quantity of humus and plant nutrients in the soil, and plant

production drops further. As protective plant cover disappears, floods become more frequent and more severe. Desertification is self-reinforcing, i.e. once the process has started, conditions are set for continual deterioration.

- Soil becomes less usable
- The soil can be blown away by wind or washed away rain. Nutrients in the soil can be removed by wind or water. Salt can build up in the soil which makes it harder for plant growth.
- Vegetation is Damaged
- Loosened soil may bury plants or leave their roots exposed. Also, when overgrazing occurs, plant species may be lost.
- Causes Famine
- Places that have war and poverty are most likely to have famine occur. Drought and poor land management contribute to famine.
- Food Loss
- The soil is not suited for growing food; therefore the amount of food being made will decline. If the population is growing, this will cause economic problems and starvation.
- People near Affected Areas
- Desertification can cause flooding, poor water quality, dust storms, and pollution. All of these effects can hurt people living near an affected region. (The Facts of Desertification and United Nations Convention to Combat Desertification, 2000)

HOW WOULD DIFFERENT DEVELOPMENT PATHS INFLUENCE DESERTIFICATION IN THE FUTURE ?

Population growth and increased food demand are expected to drive the expansion and intensification of land cultivation in drylands. If no countermeasures are taken, desertification in drylands will threaten future improvements in human well-being and possibly reverse gains in some regions.

The Millennium Ecosystem Assessment developed four plausible scenarios to explore the future of desertification and human well-being

until 2050 and beyond. The different scenarios are based on either increased globalization or increased regionalization, each combined with either a reactive or proactive way of addressing environmental issues.

In all four scenarios, the decertified area is expected to increase, though not at the same pace. Poverty and unsustainable land use practices will continue to be the main factors driving desertification in the near future, and climate change will also play a role.

Local adaptation and conservation practices can mitigate some losses of dryland services, but it will be difficult to reverse losses in terms of biodiversity and in the provision of food and water which is linked to biodiversity. Freshwater scarcity, which already affects 1-2 billion people globally, is expected to increase, causing greater stresses in drylands and ultimately a worsening of desertification.

The implementation of the U.N. Convention to Combat Desertification (UNCCD) would be particularly difficult in a regionalized-reactive world, while prospects would improve in a more globalized world with proactive ecosystem management.

During the course of the 20th Century, the average temperature has risen by between 0.3°C and 0.6°C. This is probably due to the effects of industrialization that has increased greenhouse gas emissions. Analysis of the consequences of this rise has led scientists to believe that temperatures in the drylands will rise by 2°C to 5°C every time the concentration of greenhouse gases doubles, a phenomenon expected to occur some time during the middle of the next century

The general rise in temperature will predictably raise the rate of evapotranspiration leading to a drop in soil humidity and an increase in the number of droughts. The deterioration in the condition of topsoil, particularly in the drylands, is a consequence of temperature variations, rainfall and soil humidity that exacerbate the process of desertification.

However, it is very difficult to predict rainfall patterns for any given region under consideration. Another Convention, the United Nations Framework Convention on Climate Change adopted in 1992 is dedicated to finding solutions to global warming.

SNC2D

Climate Change Research Unit

In groups of two, you will create a presentation based upon one of the following topics.

- Deforestation
- Emissions (greenhouse gases + CFC's)
- Carbon Footprint
- Extreme Weather
- Melting ice caps
- **Desertification**
- Rising sea levels and erosion
- Economic effects of climate change
- Benefits of climate change for some countries like Canada

Once the research is completed you will be producing notes for the class. The writing of the notes will be done collaboratively. You will email Mr. Winson the study notes and he will put them on the wiki. These topics will be on the final unit test, so make sure they are very detailed. You will also be presenting their work to their classmates. Each group will have 15-25 minutes to share their research in a concise and meaningful way. Your presentation must have a visual component to it. This could be a powerpoint, keynote, posters, diagrams, models and/or anything else you can think of.

Friday, April 24, 2015

Additionally, you must create a slowmotion video of your topic. The video should be at least 30 seconds (at least 60 pictures if you use two frames per second) long to fully demonstrate your topic. You can use any type of resource for obtaining the information – books, magazines, the Internet etc. You must use at least three resources. These sources must be cited along with your written notes. For further information as to how this will be assessed,

See the rubric on the back of this page.

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Group members: Jackson Mock

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